



BELLEVILLE

water pollution control plant

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ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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Belleville : water pollution
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ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET, TORONTO 5
OFFICE OF THE GENERAL MANAGER

Members of the Belleville Local Advisory Committee,
City of Belleville.

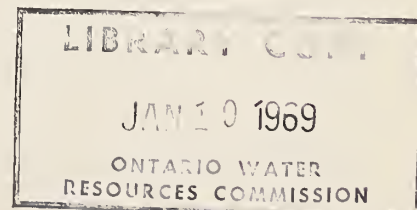
We are happy to present you with the 1967 Operating Summary for the
Belleville Water Pollution Control Plant, OWRC Project No. 2-0084-61.

Your co-operation with our staff throughout the year has been appreciated.
Only with such co-operation can the war against water pollution be waged
effectively.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly", is written over the typed name.

D. S. Caverly,
General Manager.





ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET
TORONTO 5

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D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

I am pleased to submit to you the 1967 Operating Summary for the Belleville Water Pollution Control Plant, OWRC Project No. 2-0084-61.

The summary reviews progress during the year, outlines operating problems encountered and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

A handwritten signature in cursive script, reading "D. A. McTavish".

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.



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FOREWORD

● This operating summary has been prepared in order to acquaint readers with the management of the project during 1967. The efficiency of the plant's operation is reflected in a general review. Significant financial details are recorded, and technical performance is illustrated by graphs and charts.

The summary should answer two salient questions. Are the project's facilities adequate at this time? And can the project meet future requirements?

The Regional Operations Engineer is primarily responsible for the preparation of the report, and will be pleased to answer any questions regarding it.

Most of the material for the graphs and charts was compiled by the statistics section of the Division of Plant Operations, with the final versions of the graphs being drawn by the draughting section of the Division of Sanitary Engineering. Cost data were provided by the Division of Finance.

It will be evident from the report that all of these groups co-operated with substantial success.

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BELLEVILLE
water pollution control plant

operated for

THE CITY OF BELLEVILLE

by

THE ONTARIO WATER RESOURCES COMMISSION

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DIVISION OF PLANT OPERATIONS

DIRECTOR: D. A. McTavish

Assistant Director: C. W. Perry
Regional Supervisor: P. J. Osmond
Operations Engineer: J. N. Dick

801 Bay Street Toronto 5

'67 REVIEW

The Belleville Water Pollution Control Plant treated a total of 2396 million gallons of sewage in 1967. This represents an average daily flow of 6.56 million gallons per day.

The operating cost was \$55,314.58. This exceeded the 1966 operating cost by approximately \$3,650, but was some \$3,400 less than the budgeted amount due to a delay in hiring a mechanic operator.

High flows were again received at the plant in 1967. The average daily flow was over twice the design flow of 3 mgd. The highest flows were registered during the months of February, March, April, November and December.

Considerable mechanical trouble with the air blowers was experienced. Two new impellers were needed for one blower and minor repairs were done on the other.

The No. 4 pump at the Front Street pumping station continued to give trouble and it was necessary to replace the sleeves and bearings. With actual flows much greater than the design flow, the pumping head exceeded the design head, thus straining the pumping equipment abnormally.

The boiler controls were altered to provide automatic operation. Previously the boiler could automatically switch from gas to oil, but not the reverse. The new controls made switching over both ways automatic.

An addition to the staff, Mr. R. Grey, was engaged in May, as a mechanic operator.

The plant was inspected by head office personnel several times during the year and found to be in satisfactory condition. A feeling of teamwork was evident among the plant staff members, which no doubt aided in the present efficient operation.

PROJECT COSTS

NET CAPITAL COST (Estimated)	\$1,999,587.97
DEDUCT - Portion Financed by CMHC (Estimated)	<u>1,283,187.17</u>
Long Term Debt to OWRC	\$ <u>716,400.80</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1967	\$ <u>72,809.32</u>
Debt Retirement	\$ 14,457.00
Reserve	11,817.86
Interest Charged	40,400.30
Net Operating	55,314.58
TOTAL	\$ <u>121,989.74</u>

RESERVE ACCOUNT

Balance at January 1, 1967	\$ 50,431.64
Deposited by Municipality	11,817.86
Interest Earned	<u>3,121.63</u>
	\$ 65,371.13
Less Expenditures	
Balance at December 31, 1967	\$ <u>65,371.13</u>

MONTHLY OPERATING COSTS

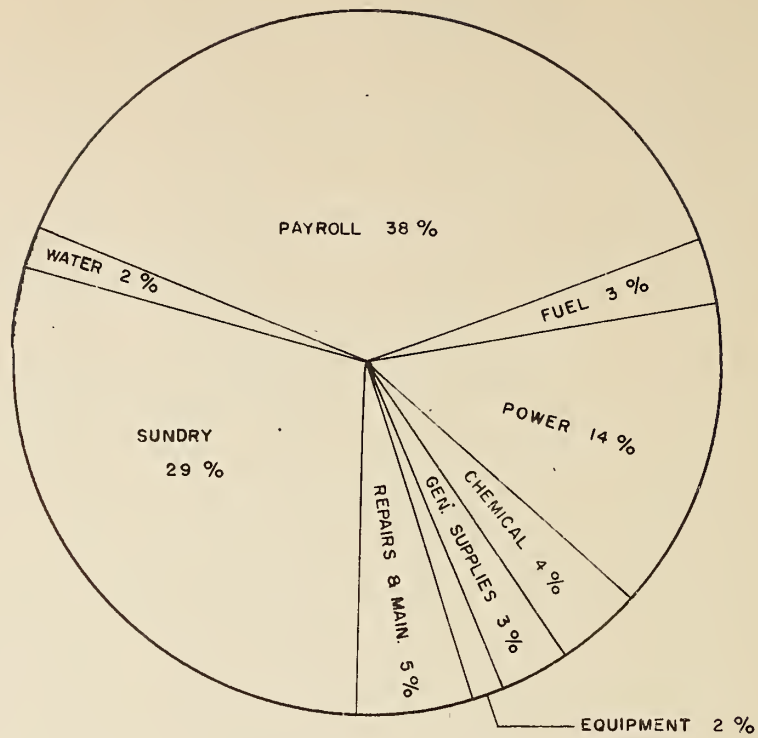
MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	1,906.85	1,299.72		355.89					225.03	26.21
FEB	2,348.73	1,275.14	130.10	687.81		60.63		76.96	62.52	55.57
MARCH	4,801.04	2,071.40	364.56	689.03		166.62		53.52	1354.56	101.35
APRIL	2,840.17	1,357.65	229.03	713.90		120.74		177.36	199.50	41.99
MAY	3,805.56	1,092.99	110.25	767.59	1029.00	87.95		9.83	66.93	41.02
JUNE	12,441.46	1,777.68	117.60	724.99		127.79			9624.83	68.57
JULY	3,688.61	1,749.72	117.60	614.13		145.97	206.34	376.93	306.09	171.83
AUG	4,100.21	1,813.61		574.75	1109.85	237.10		138.02	72.16	154.72
SEPT	4,360.97	2,658.62		575.77		60.87	43.68	400.28	431.51	190.24
OCT	4,769.41	1,814.99	136.71	556.51		36.57	448.05	40.68	1588.31	147.59
NOV	5,219.16	1,849.99	117.60	746.99		300.01	165.38	134.93	1721.57	182.69
DEC	5,032.41	1,769.21	244.02	983.90		127.63	44.66	1331.10	430.68	101.21
TOTAL	55,314.58	21,130.72	1567.47	7991.26	2138.85	1471.88	908.11	2739.61	16083.69	1282.99

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$1,893.60

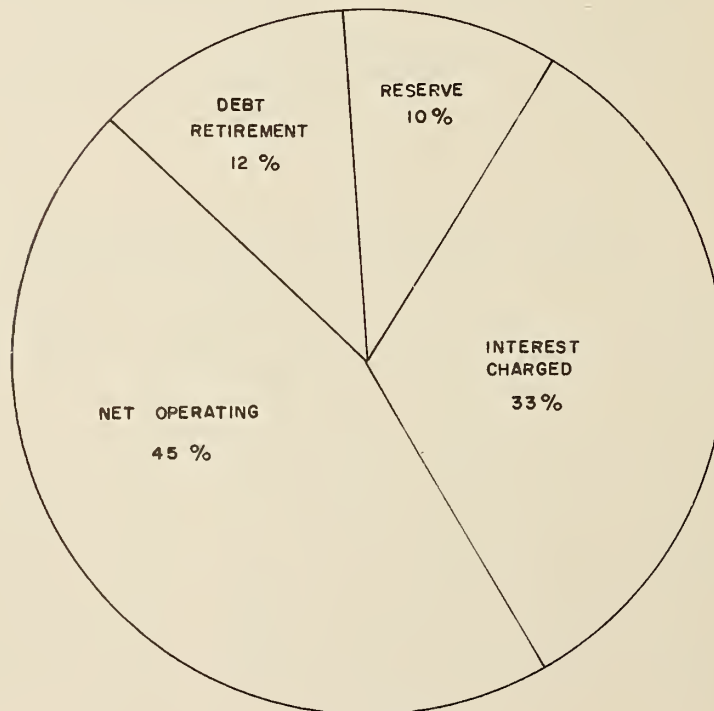
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1963	1400	\$42895	\$30.64	\$0.06
1964	1880	\$41245	\$21.94	\$0.025
1965	2070	\$45122	\$21.80	\$0.05
1966	1994	\$51655	\$25.91	\$0.08
1967	2396	\$55314	\$23.09	\$0.03

1967 OPERATING COSTS



TOTAL ANNUAL COST



Process Data

PROBABILITY OF FLOWS

The 1967 probability of flow graph shows that the flow increased substantially. A flow of 6.6 mgd was received 50 percent of the time. Twice the design flow of 3.0 mgd was received 83 percent of the time.

DAILY FLOWS

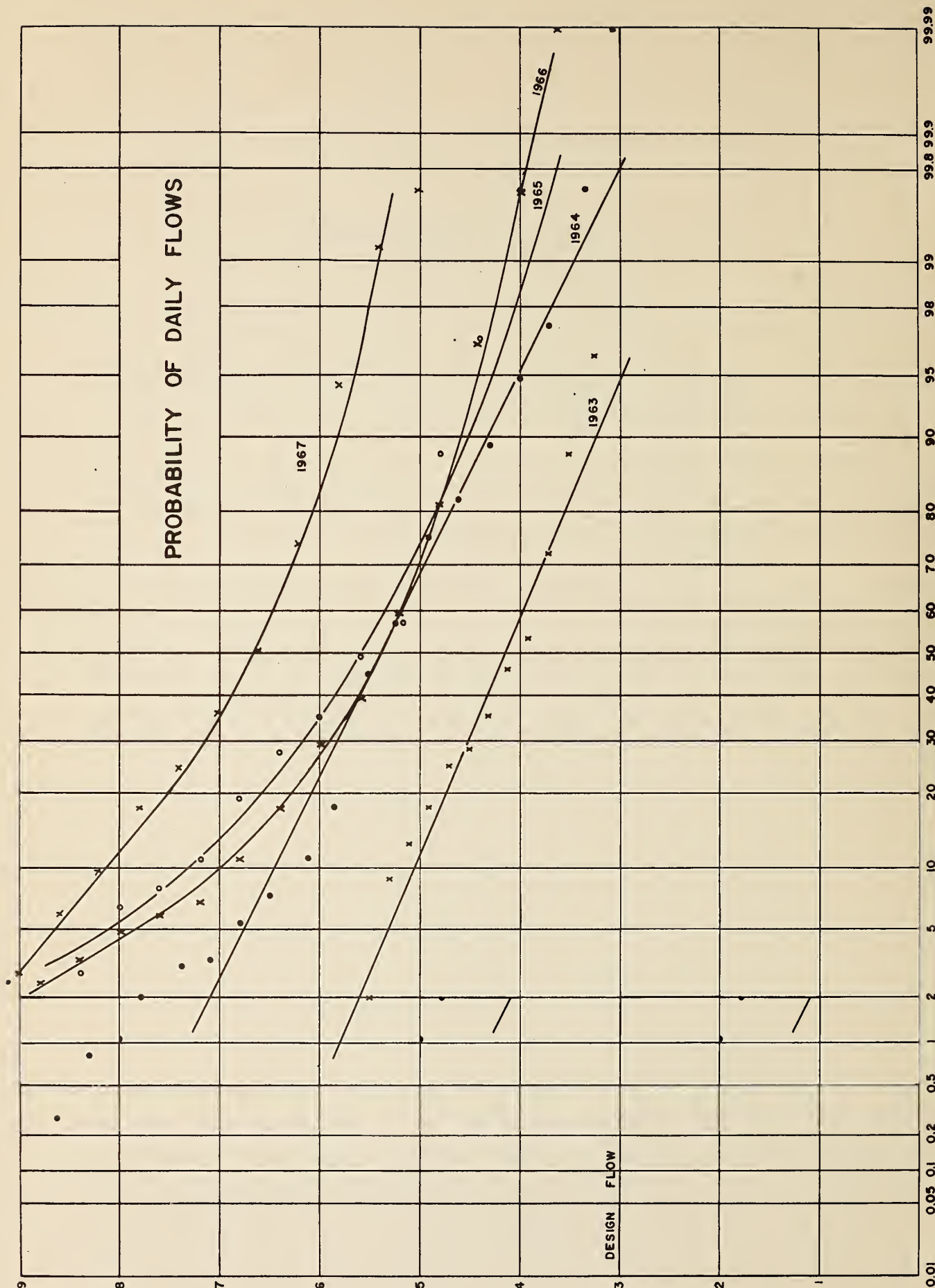
The daily flow plot shows very little variation, with the flows fluctuating near the 6.0 mgd level.

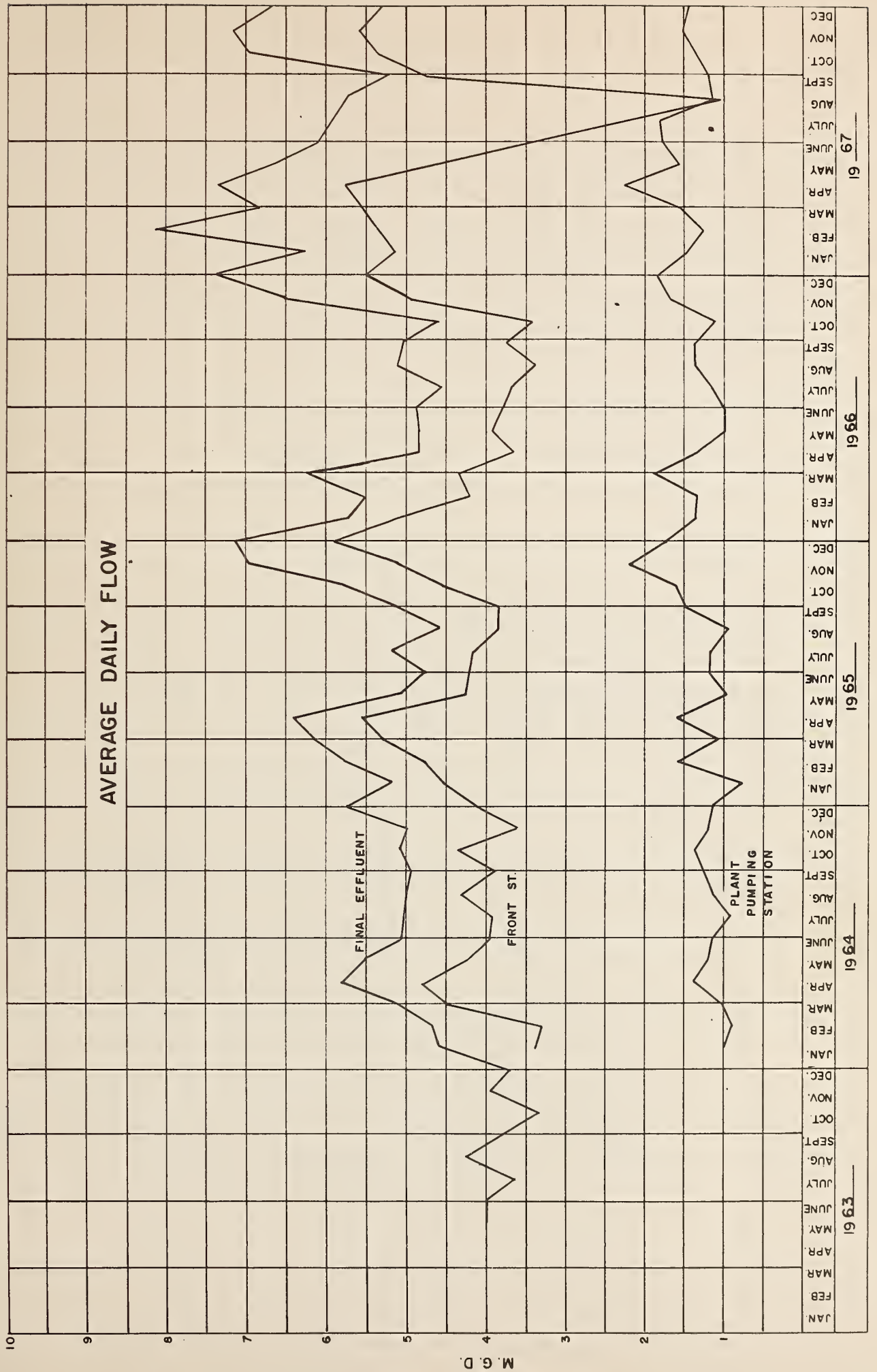
PROBABILITY OF DAILY FLOWS

MILLION GALLONS PER DAY

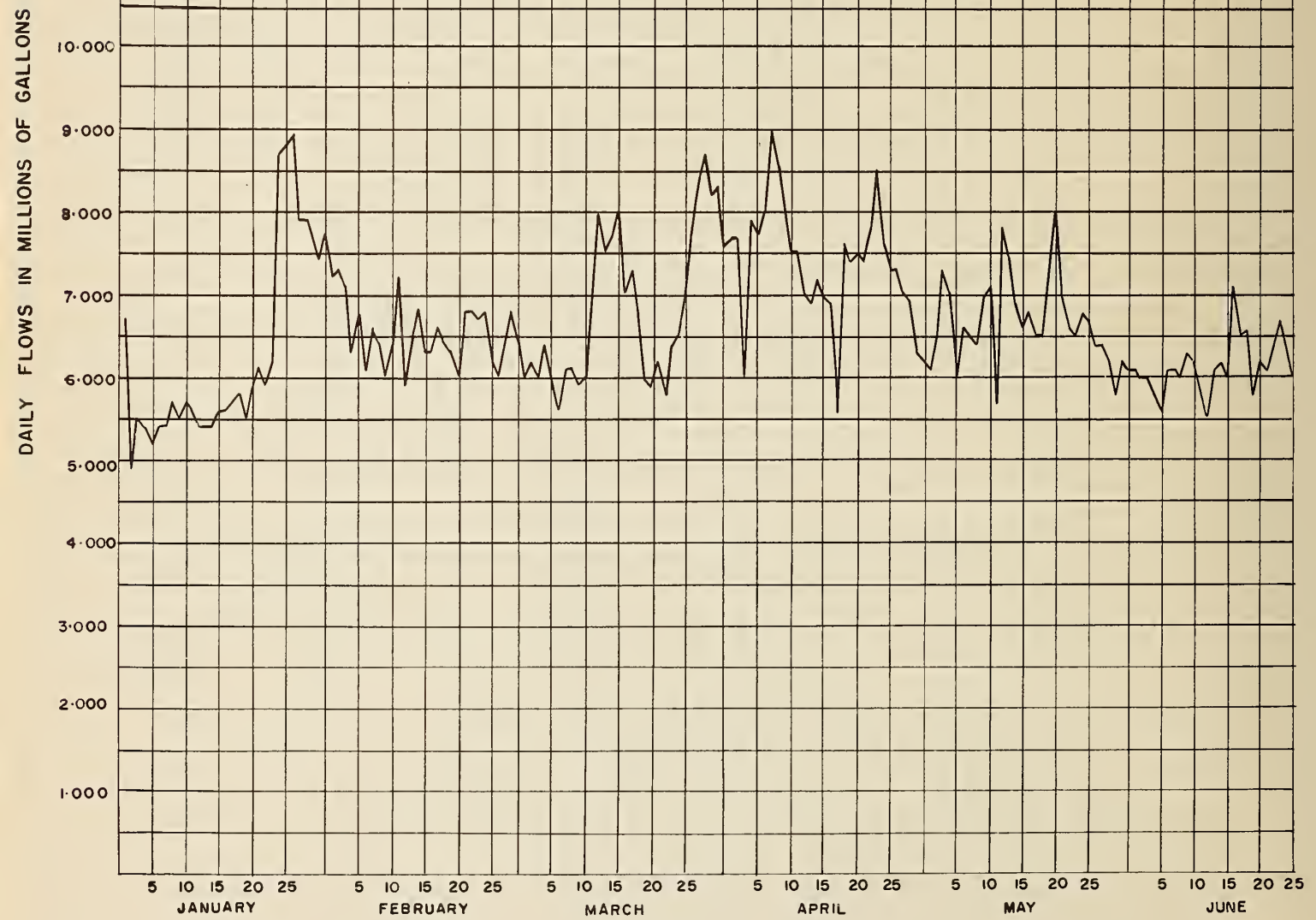
DESIGN FLOW

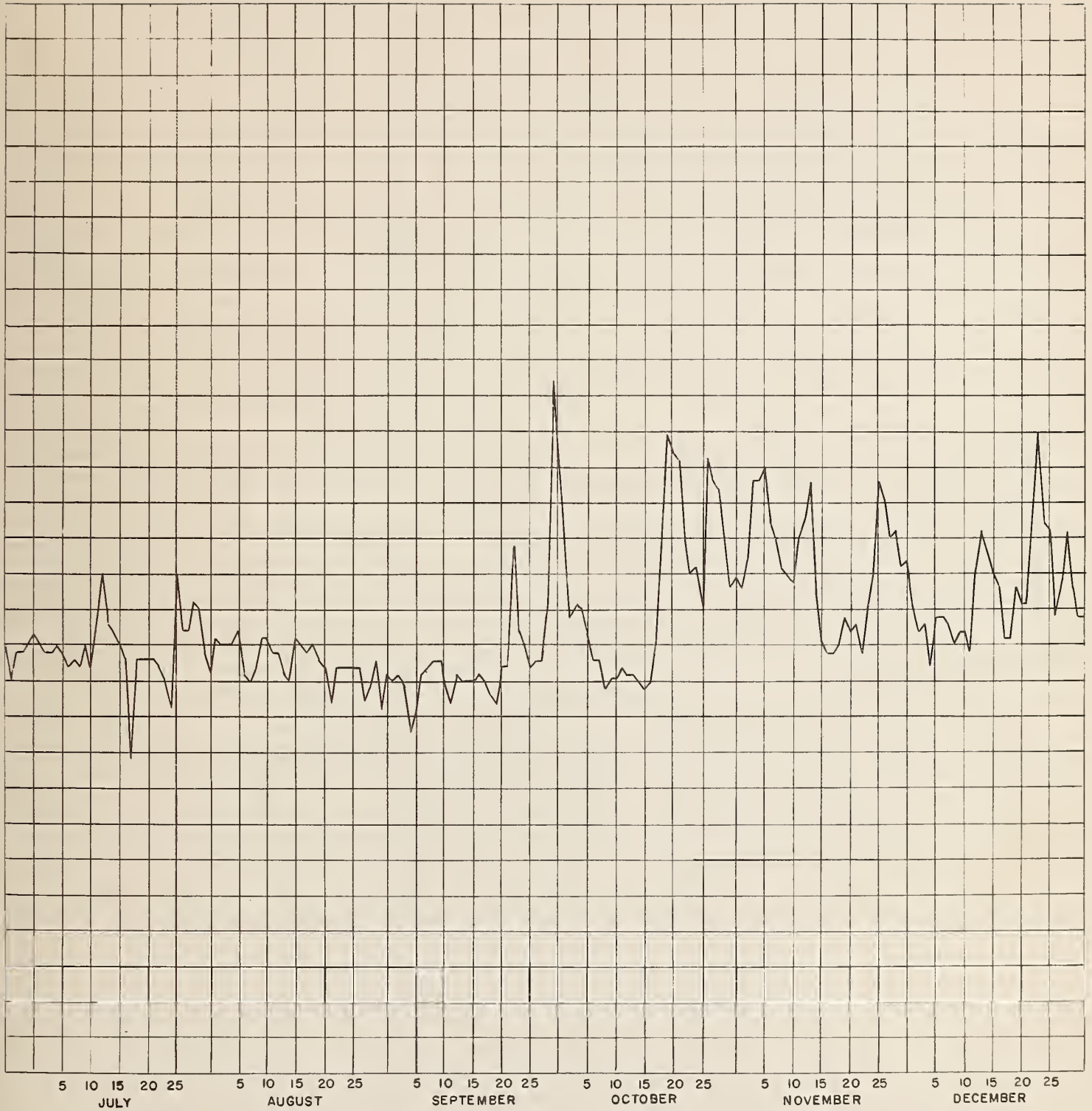
PERCENT OF TIME FLOW IS EQUAL TO OR GREATER THAN

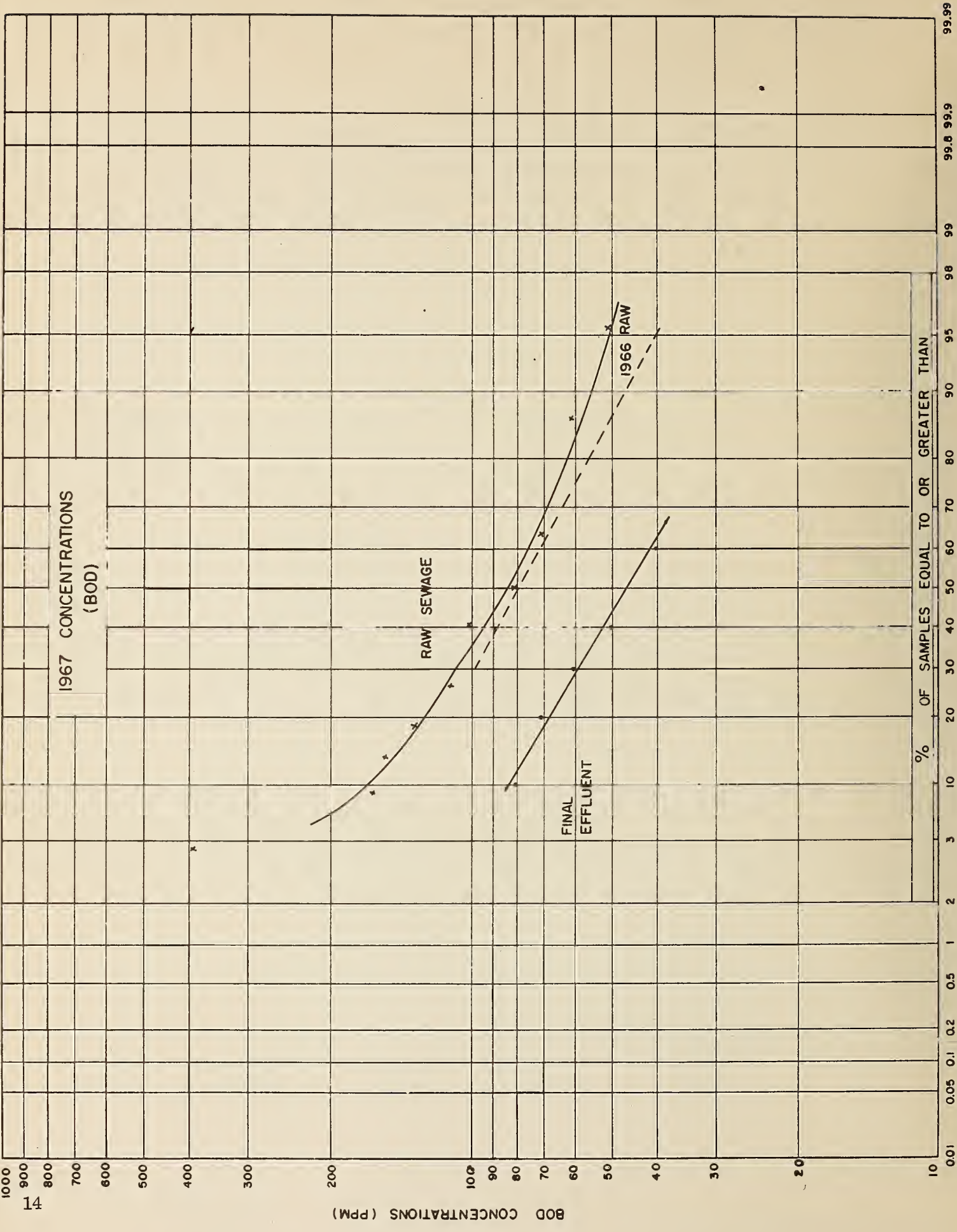


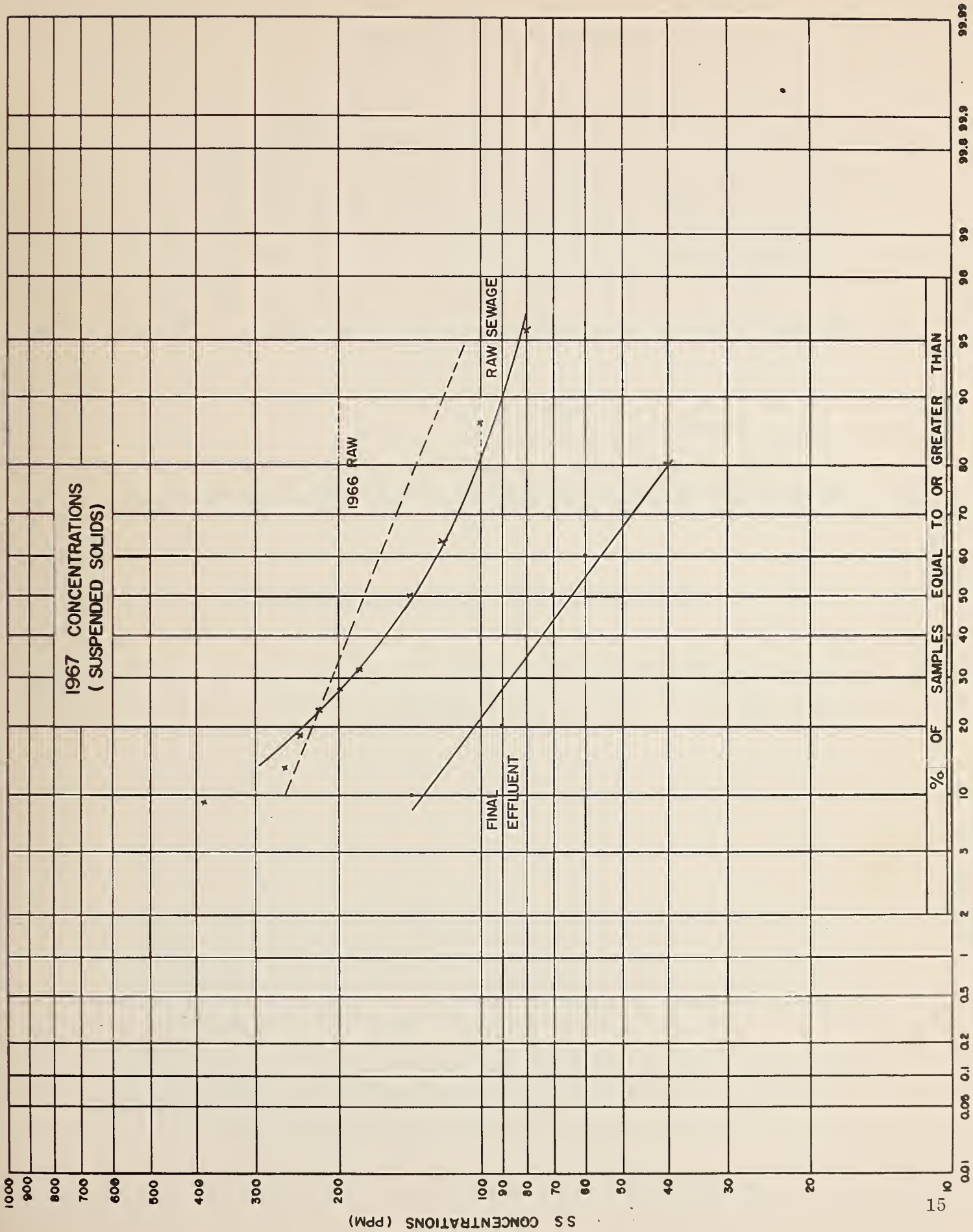


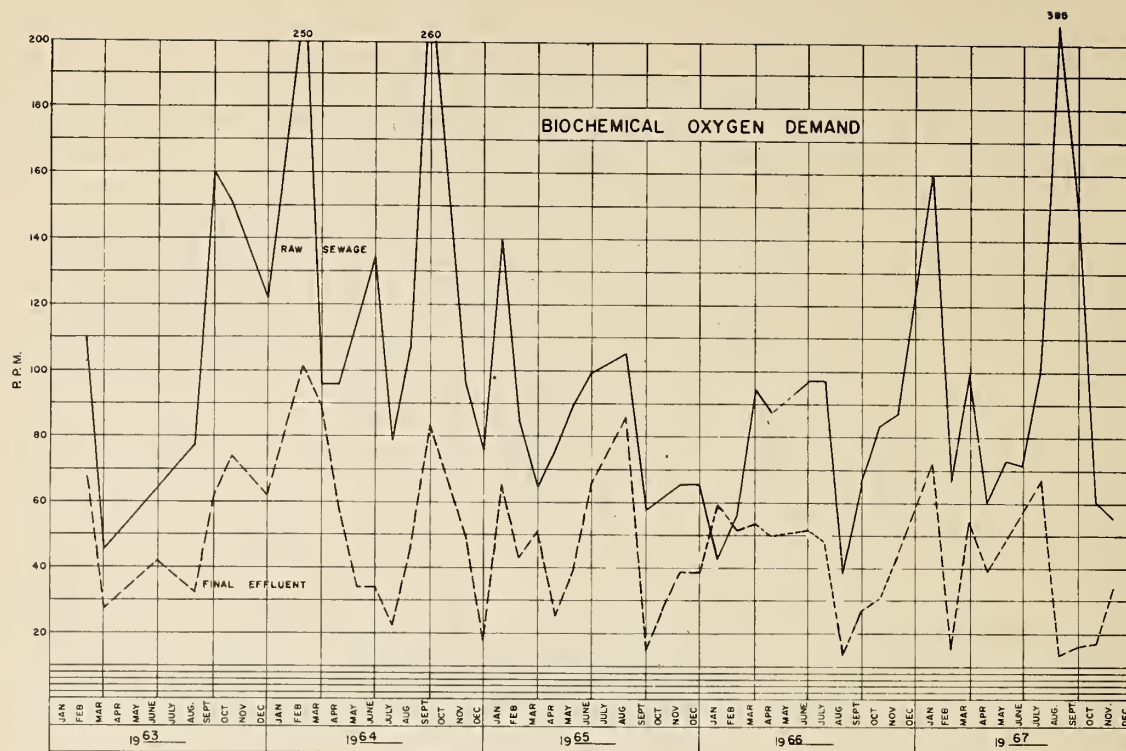
DAILY FLOWS FOR 1967



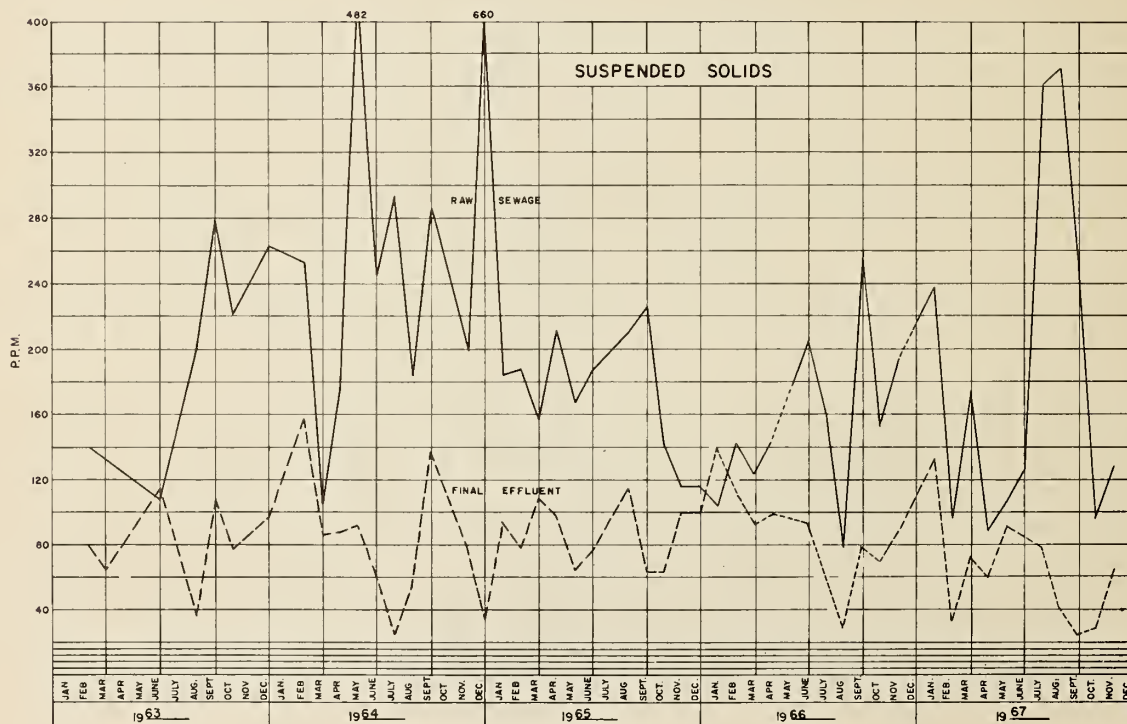








MONTHLY VARIATIONS



GRIT, B.O.D AND S. S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	160	72	55.0	85.6	238	132	44.5	146.0	135
FEB.	67	15	77.6	59.0	96	32	66.7	72.6	-
MAR.	100	54	46.0	48.8	176	72	59.1	110.2	162
APR.	60	39	35.0	23.2	88	59	33.0	32.0	-
MAY	73	48	34.2	25.9	106	90	15.1	16.5	162
JUNE	72	-	-	-	125	-	-	-	-
JULY	100	67	3.30	30.38	362	78	78.4	26.4	162
AUG.	385	13	96.6	332.2	372	40	89.2	296.5	-
SEPT.	150	16	89.3	105.6	252	24	90.5	179.7	162
OCT.	61	17	72.1		96	28	70.8	71.13	-
NOV.	55	34	38.2	22.43	128	64	50.0	68.35	-
DEC.	-	-	-	-	-	-	-	-	162
TOTAL	-	-	-	946.58	-	-	-	1,473.79	945
AVG.	117	38	57.7	78.88	185	62	59.7	122.81	79

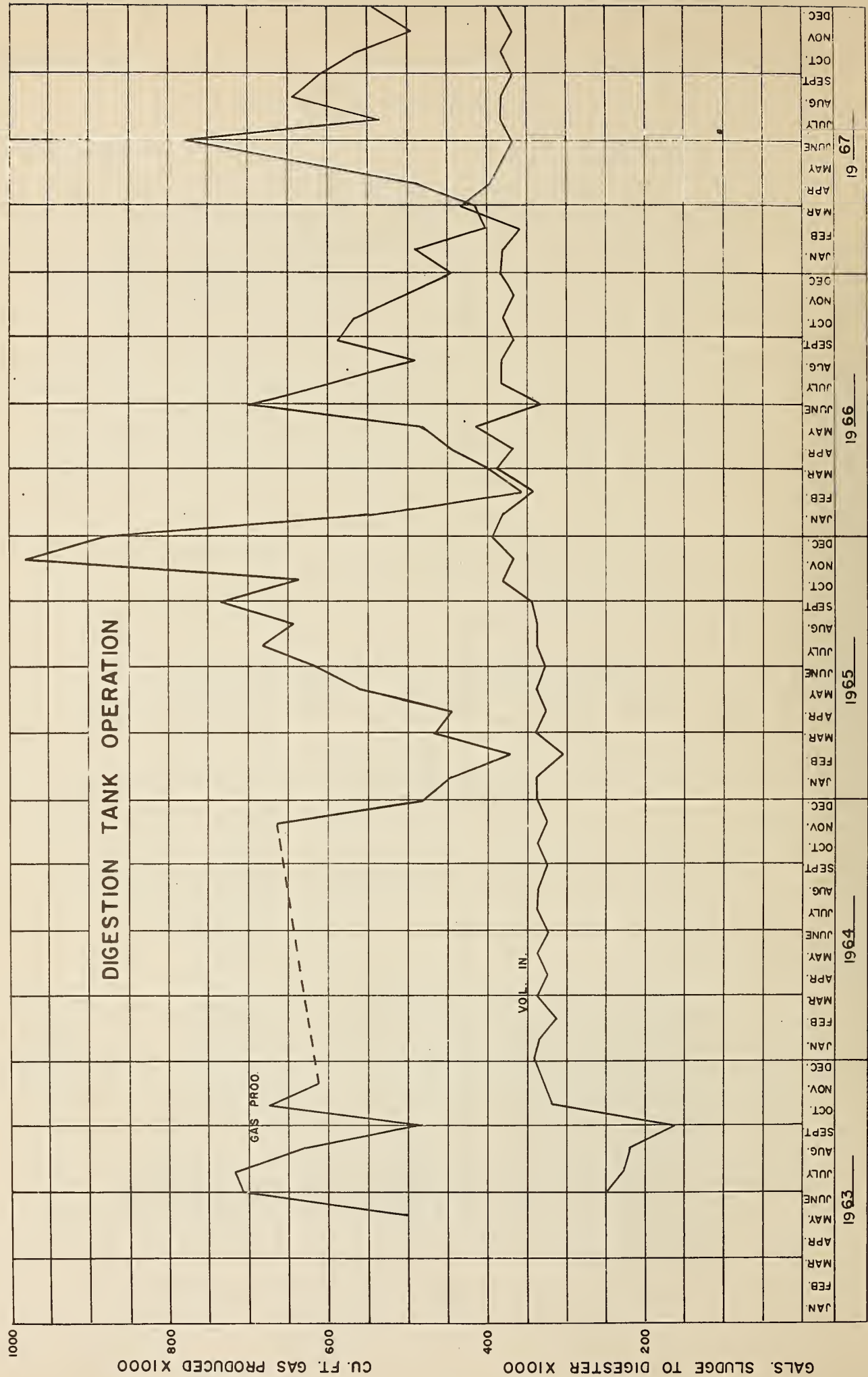
COMMENTS

In 1967, ten, eight-hour composite samples were collected from the plant influent and effluent and submitted to the OWRC Laboratory for analysis. The results of these analyses indicate that the average BOD of the influent was 117 ppm and the average SS of the influent was 185 ppm. The results of the effluent analyses indicate an average BOD of 38 ppm and a SS of 84 ppm. This represents a BOD reduction of 59% and a SS reduction of 66.5%.

A total of 947 tons of BOD and 1474 tons SS was removed from the sewage in 1967. These figures show a considerable increase from the 1966 figures.

The total quantity of grit removed at the plant in 1967 was 945 cubic feet, 400 cubic feet less than that received in 1966.

For a primary treatment plant the removals stated above are satisfactory.



DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	GALLONS	% SOLIDS	% VOL. MAT	GALLONS	% SOLIDS	% VOL. MAT	
JAN	381,393	2.61	-	42,000	10.57	-	490.691
FEB	360,152	.42	-	60,000	8.18	-	401.349
MAR.	432,288	2.02	-	39,424	8.36	-	414.698
APR	399,261	1.28	-	48,000	14.70	-	487.888
MAY	381,548	1.82	69.23	274,000	12.50	36.56	625.046
JUNE	369,240	-	-	46,000	-	-	781.255
JULY	381,548	-	-	64,000	-	-	536.805
AUG.	381,548	-	-	41,000	-	-	647.408
SEPT.	369,240	-	-	28,200	-	-	614.346
OCT.	381,548	1.44	73.61	57,000	7.56	42.20	569.653
NOV.	369,240	.71	71.83	108,000	7.36	39.00	497.562
DEC.	381,548	-	-	43,000	-	-	539.419
TOTAL	4,588,554	-	-	850,624	-	-	6606.120
AVG.	382,380	1.47	71.56	70,885	9.89	39.25	550.510

COMMENTS

In 1967, a total of 4,588,554 gallons of sludge was pumped to the digesters with a total solids concentration of 1.47%. The quantity of sludge removed from the digesters was 850,624 gallons with total solids concentration averaging 9.89%. This represents a reduction in volume of 81.5%

The gas produced from the sludge decomposed in the digesters amounted to 66,061,200 cubic feet.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	194.60	-	-
FEBRUARY	226.90	-	-
MARCH	212.00	-	-
APRIL	221.00	-	-
MAY	206.80	2670	2.86
JUNE	183.10	5135	2.80
JULY	184.10	5010	3.01
AUGUST	178.60	4775	2.67
SEPTEMBER	157.60	4734	3.00
OCTOBER	209.20	5191	2.48
NOVEMBER	213.60	2430	2.28
DECEMBER	208.90	-	-
TOTAL	2396.40	29945	-
AVERAGE	199.70	5989	2.73

COMMENTS

Chlorination is practised at the Belleville Water Pollution Control Plant to disinfect the final effluent from the plant before it is discharged into the Bay of Quinte. Chlorination commenced on May 17, and was discontinued on November 15. A total of 29,945 pounds of chlorine was used to obtain a chlorine residual of 0.5 ppm after fifteen minutes of contact.

RECOMMENDATIONS

The City of Belleville should continue its program to remove storm water from the sanitary sewer system.

Date Due			

ONTARIO WATER RESOURCES COMMISSION DIVISION OF PLANT OPERATIONS.	
BELLEVILLE WATER POLLUTION CONTROL PLANT - OPERATING SUMMARY 1967	
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